



Direct measurement of the aerosol absorption and extinction cross section for a variety of chemical and biological simulants in the LWIR

Kristan P. Gurton

Rachid Dahmani

David Ligon

Army Research Laboratory, Adelphi MD

Burt Bronk

Air Force Research Laboratory at SBCCOM

Edgewood Chemical Biological Center

Aberdeen Proving Grounds, MD

Report Documentation Page				Form Approved OMB No. 0704-0188	
Public reporting burden for the collection of information is estimated to average 1 hour per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden, to Washington Headquarters Services, Directorate for Information Operations and Reports, 1215 Jefferson Davis Highway, Suite 1204, Arlington VA 22202-4302. Respondents should be aware that notwithstanding any other provision of law, no person shall be subject to a penalty for failing to comply with a collection of information if it does not display a currently valid OMB control number.					
1. REPORT DATE 01 OCT 2005		2. REPORT TYPE N/A		3. DATES COVERED -	
4. TITLE AND SUBTITLE Direct measurement of the aerosol absorption and extinction cross section for a variety of chemical and biological simulants in the LWIR				5a. CONTRACT NUMBER	
				5b. GRANT NUMBER	
				5c. PROGRAM ELEMENT NUMBER	
6. AUTHOR(S)				5d. PROJECT NUMBER	
				5e. TASK NUMBER	
				5f. WORK UNIT NUMBER	
7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES) Army Research Laboratory, Adelphi MD				8. PERFORMING ORGANIZATION REPORT NUMBER	
9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES)				10. SPONSOR/MONITOR'S ACRONYM(S)	
				11. SPONSOR/MONITOR'S REPORT NUMBER(S)	
12. DISTRIBUTION/AVAILABILITY STATEMENT Approved for public release, distribution unlimited					
13. SUPPLEMENTARY NOTES See also ADM001851, Proceedings of the 2003 Joint Service Scientific Conference on Chemical & Biological Defense Research, 17-20 November 2003. , The original document contains color images.					
14. ABSTRACT					
15. SUBJECT TERMS					
16. SECURITY CLASSIFICATION OF:			17. LIMITATION OF ABSTRACT UU	18. NUMBER OF PAGES 9	19a. NAME OF RESPONSIBLE PERSON
a. REPORT unclassified	b. ABSTRACT unclassified	c. THIS PAGE unclassified			

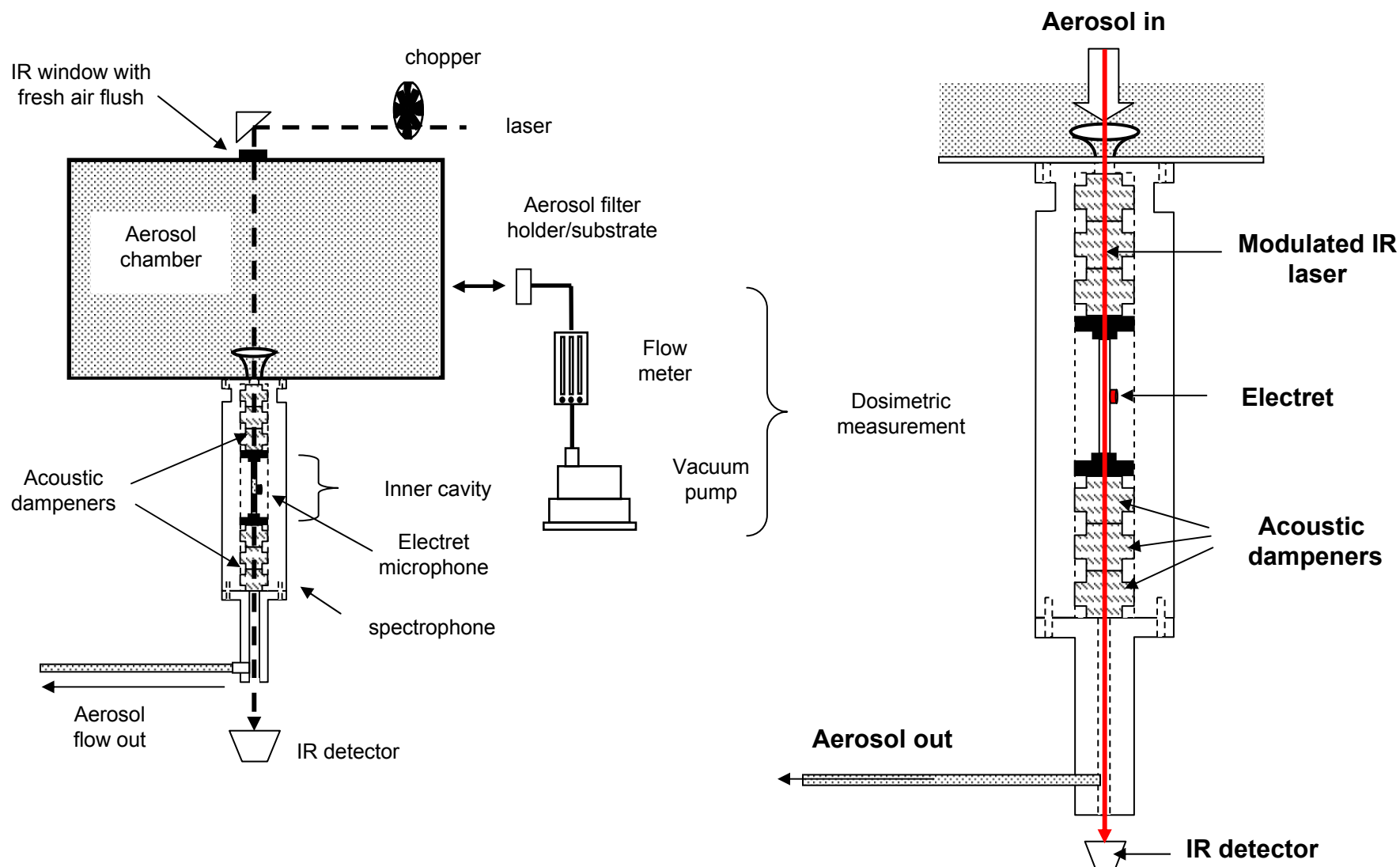


***In situ* measurement of the mass normalized extinction and absorption coefficients for chemical and biological simulants using flow-through aerosol photoacoustics**





Aerosol spectroscopy using flow-through photoacoustics

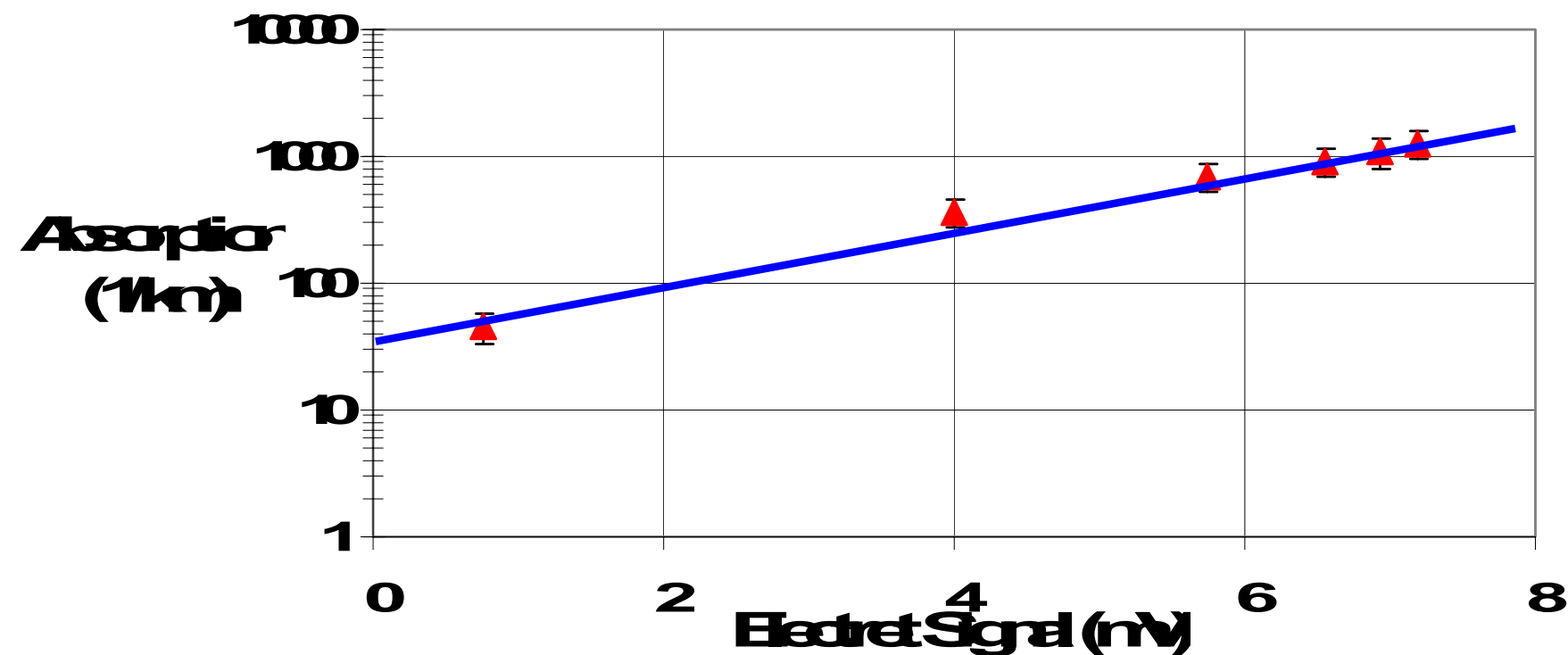




Typical spectrophone calibration using Isopropanol vapor

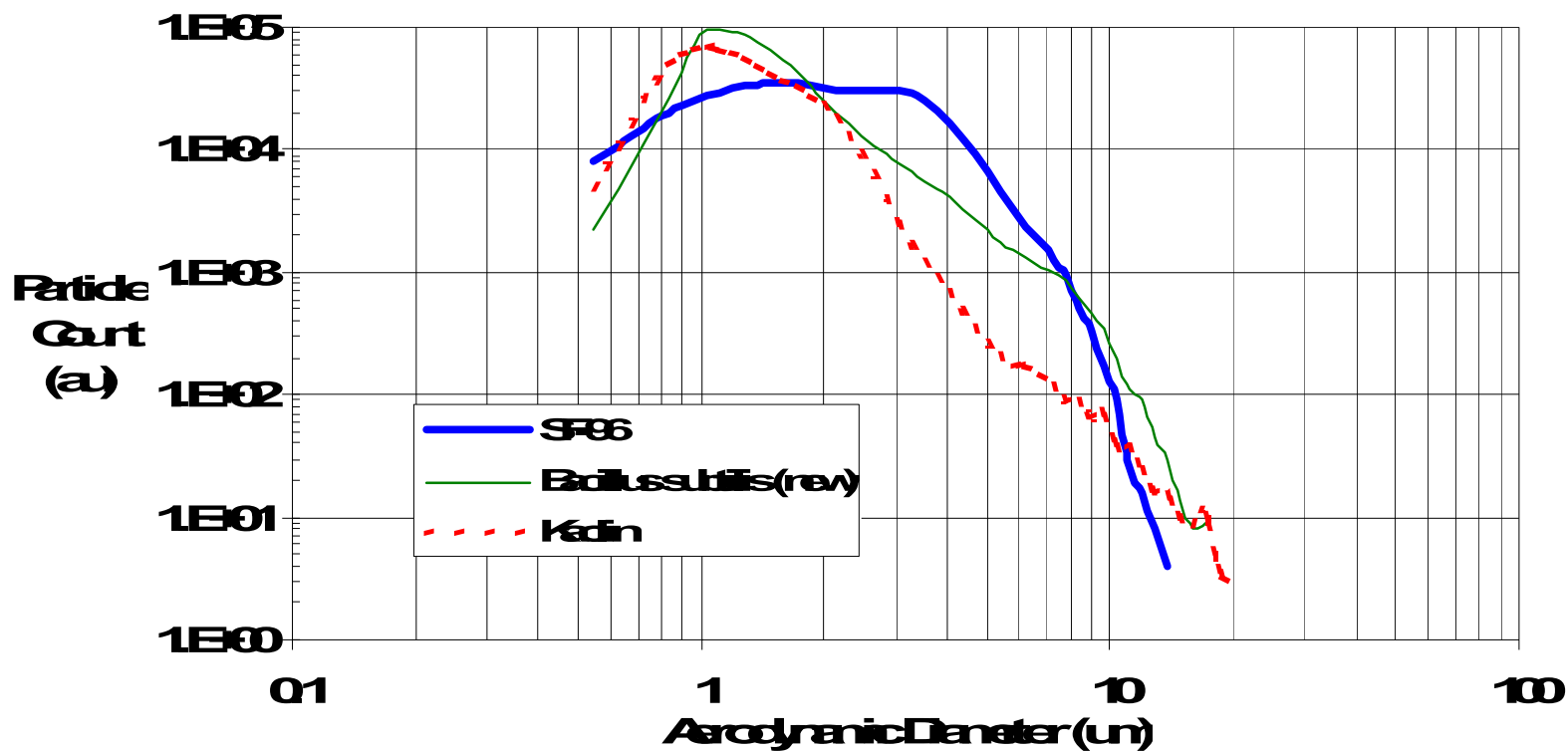
Extinction = scatter + absorption

For a calibration gas
extinction = absorption



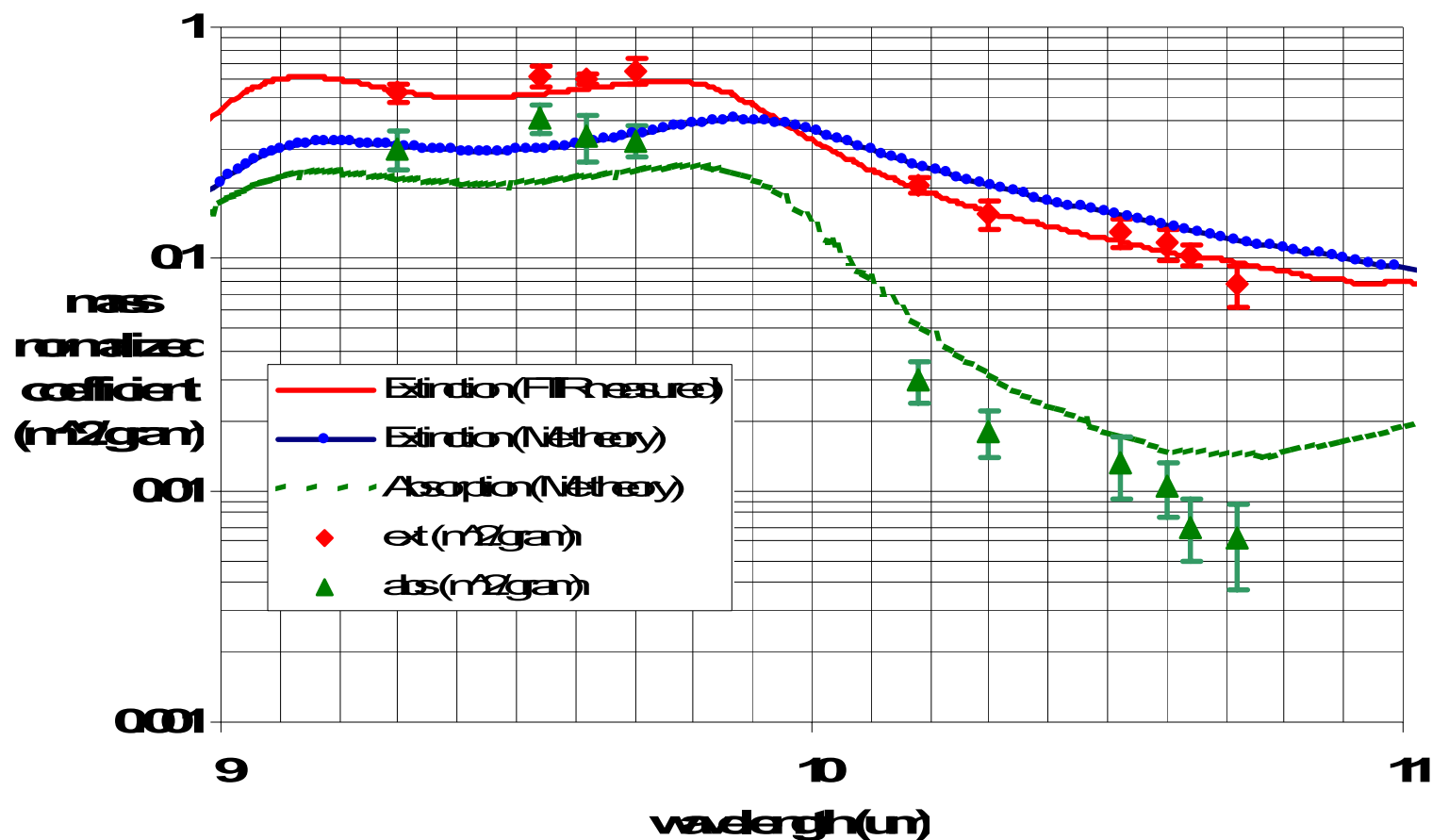


Measured size distributions for silicone oil SF-96, bacillus subtilis endospores, and Kaolin clay aerosol



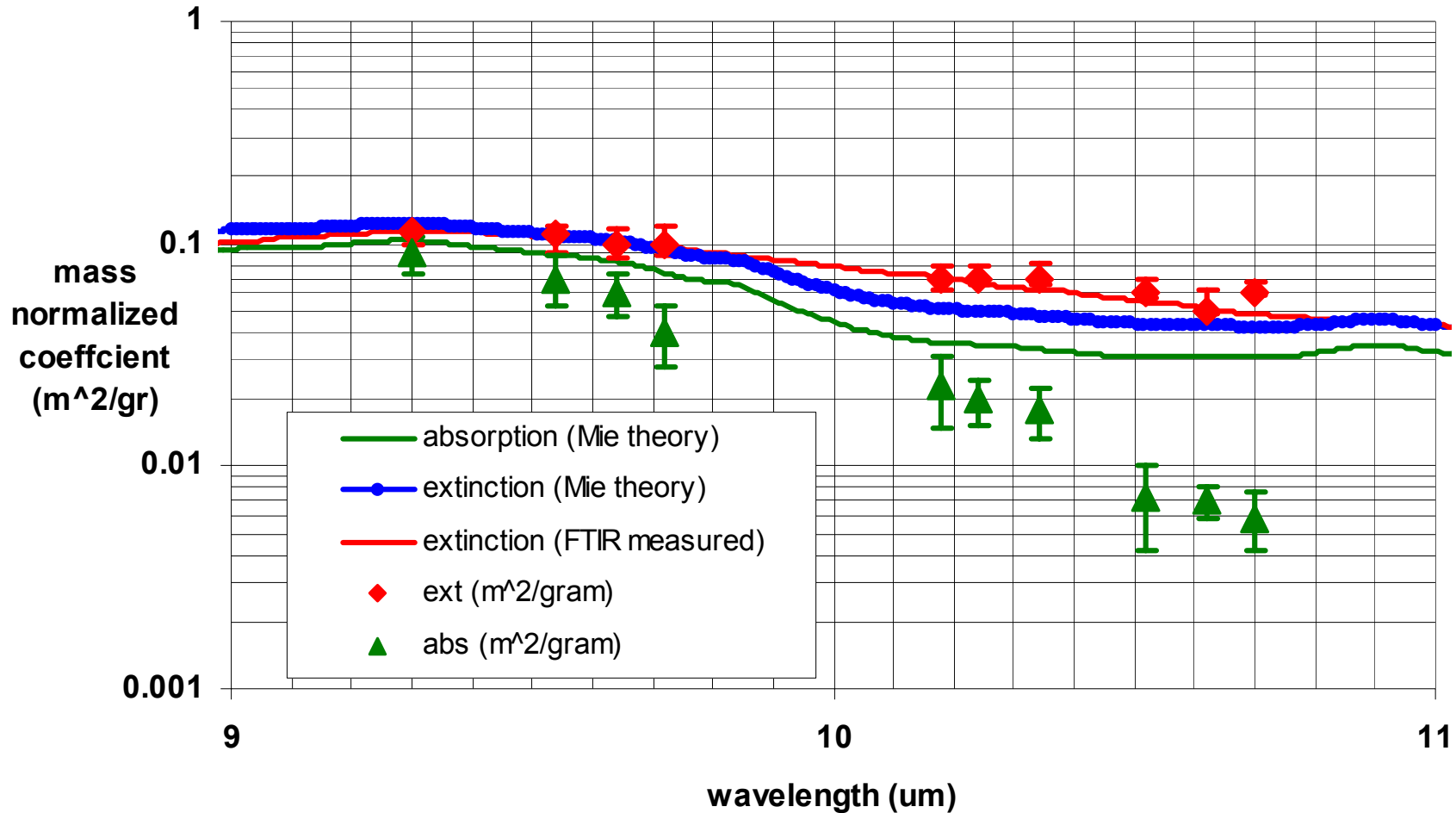


Comparison of the extinction and absorption cross-sections for aerosolized silicone oil SF-96, grade 50



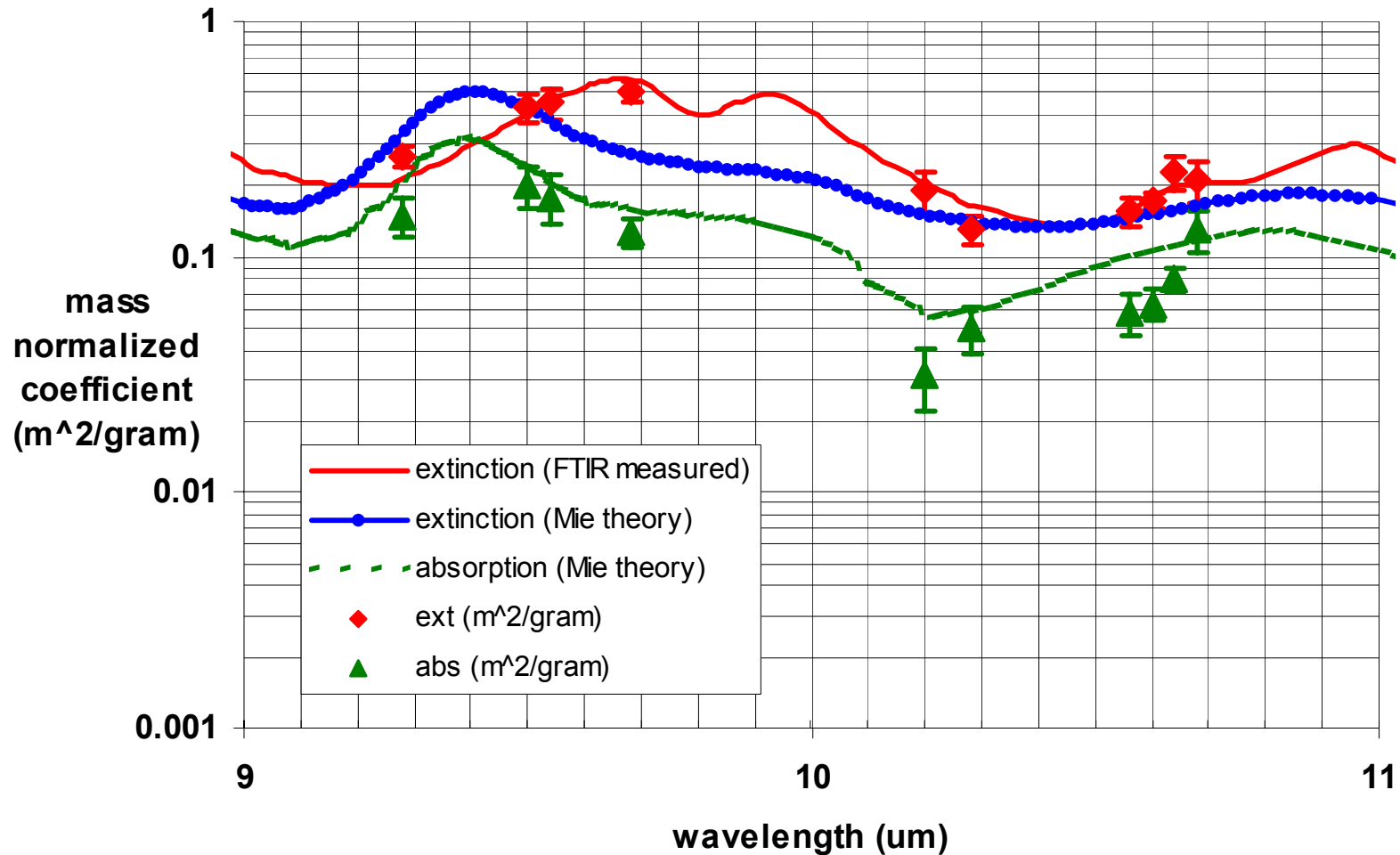


Comparison of the extinction and absorption cross-sections for aerosolized bacillus subtilis endospores





Comparison of the extinction and absorption cross-sections for Kaolin clay aerosol





Future



- Consider additional chemical and biological simulants, including other naturally occurring background aerosols.
- Extend photoacoustic study to incorporate MIR wavelengths by introducing a new tunable CO laser system, i.e., 5-6 μm .
- Begin to investigate the utility of a new/novel technique termed “Single particle emission spectroscopy”.

